Galaxy Luminosity Functions (contd)

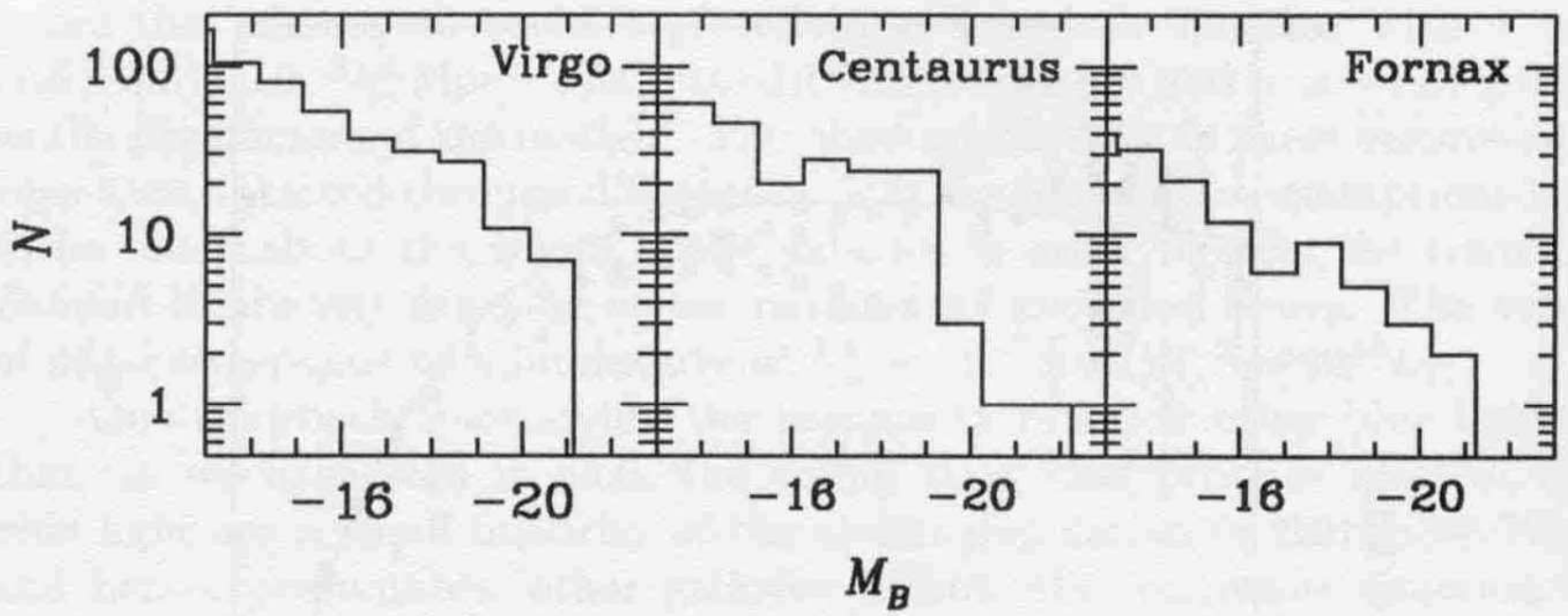


Figure 4.13 Number of galaxies as a function of absolute magnitude [$\propto \Phi(M)$] found in the central regions of the Virgo, Centaurus and Fornax clusters [From data published in Jerjen & Tammann (1997)]

LF of clusters

à Overall shape can be roughly described by a Schechter LF (SLF) with a steeper slope (alpha = -1.3) than field LF

à Detailed shape of cluster LF deviates from SLF and has sub-structures, such as a dip at M(B) = -16 + 5 log h

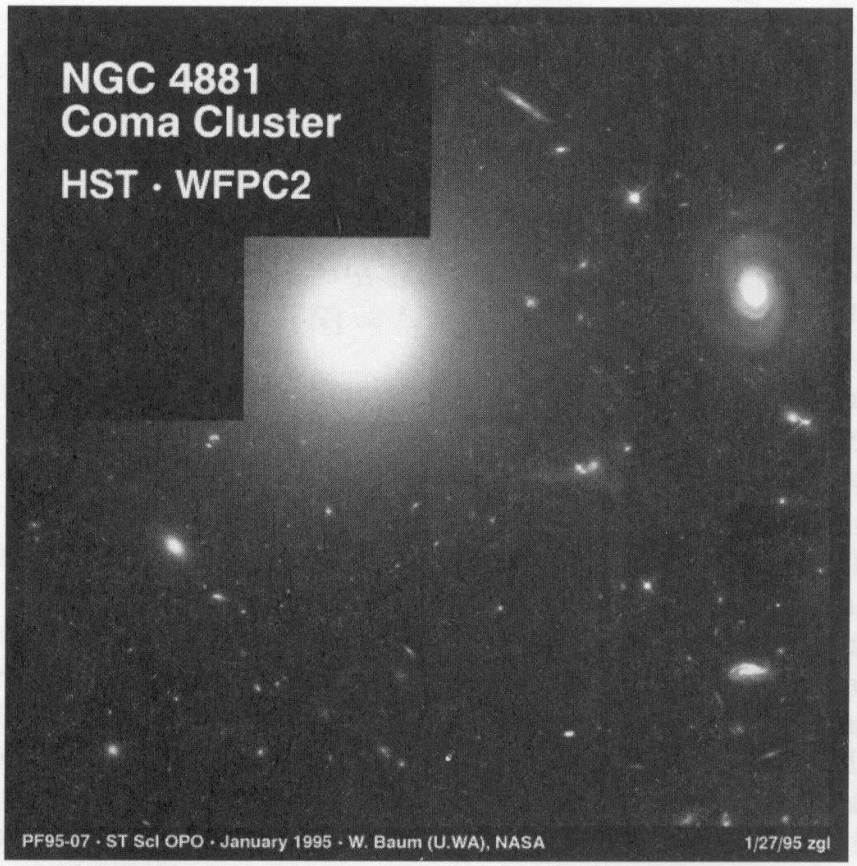


Figure 4.29 The cD NGC 4881 is located near the center of the Coma cluster and is surrounded by a swarm of much less luminous galaxies. [Figure courtesy of STScI]

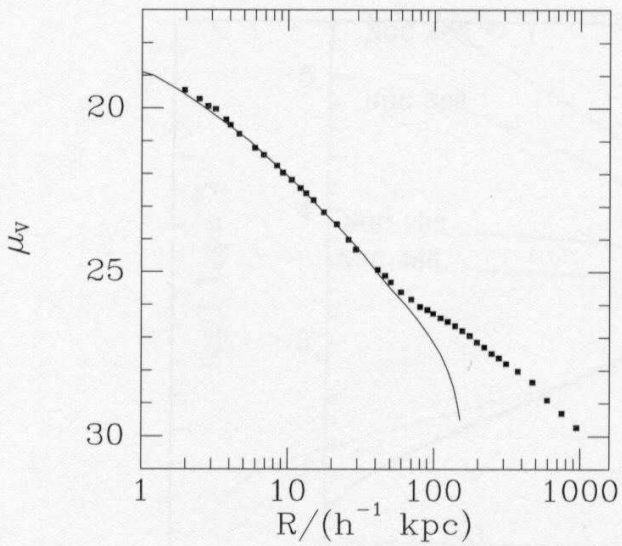


Figure 4.28 The surface-brightness profile of the cD galaxy that lies at the center of the cluster Abell 1413 (points). The line shows the $R^{1/4}$-law that best fits the inner points. [From data kindly provided by J. Schombert based on the work of Oemler (1976).]

Acc. to Schechter LF (SLF), no of galaxies with L>10 L* (e.g., cD galaxies) are ~inexistent

à SLF fails in center of very rich clusters, such as Coma , whose center contains a cD galaxy

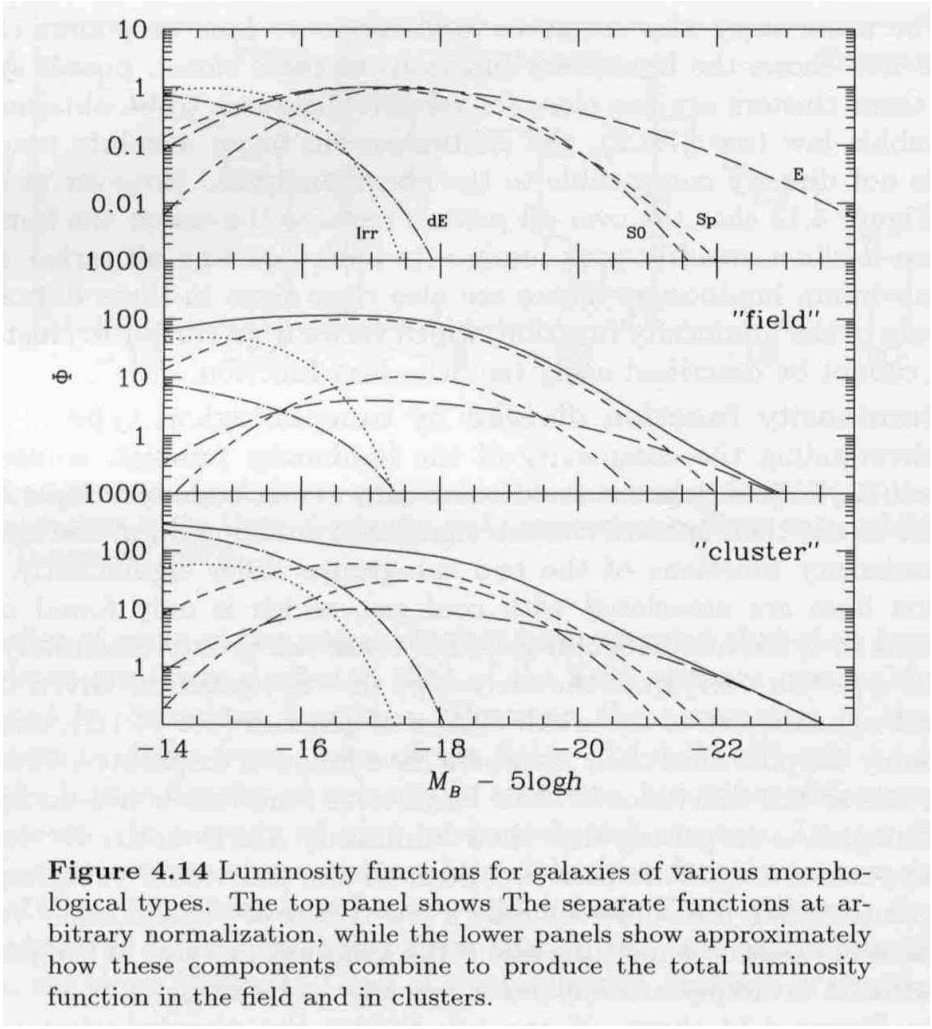


Figure 4.14 Luminosity functions for galaxies of various morphological types. The top panel shows The separate functions at arbitrary normalization, while the lower panels show approximately how these components combine to produce the total luminosity function in the field and in clusters.

LF for different morphological types (E, S0, Sa-Sc, Irr dE) in both field and clusters!

Notice dominance of early type galaxies in LF of clusters (aka morphology-density relation)

- à dE w.r.t. Irr at faint end
- à S0 and E w.r.t. spirals at bright end

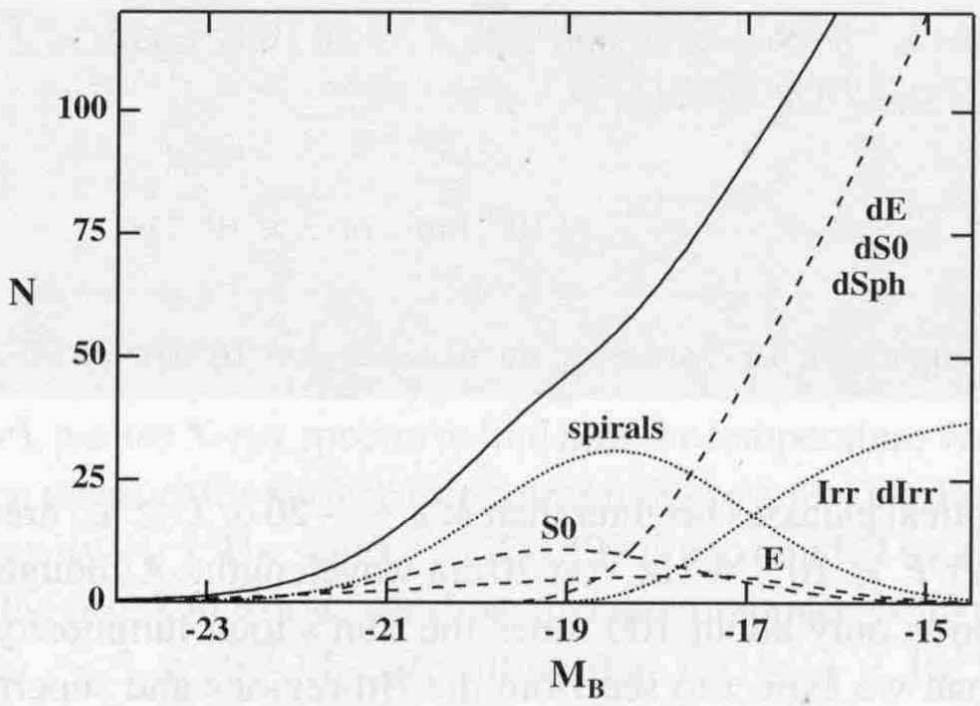
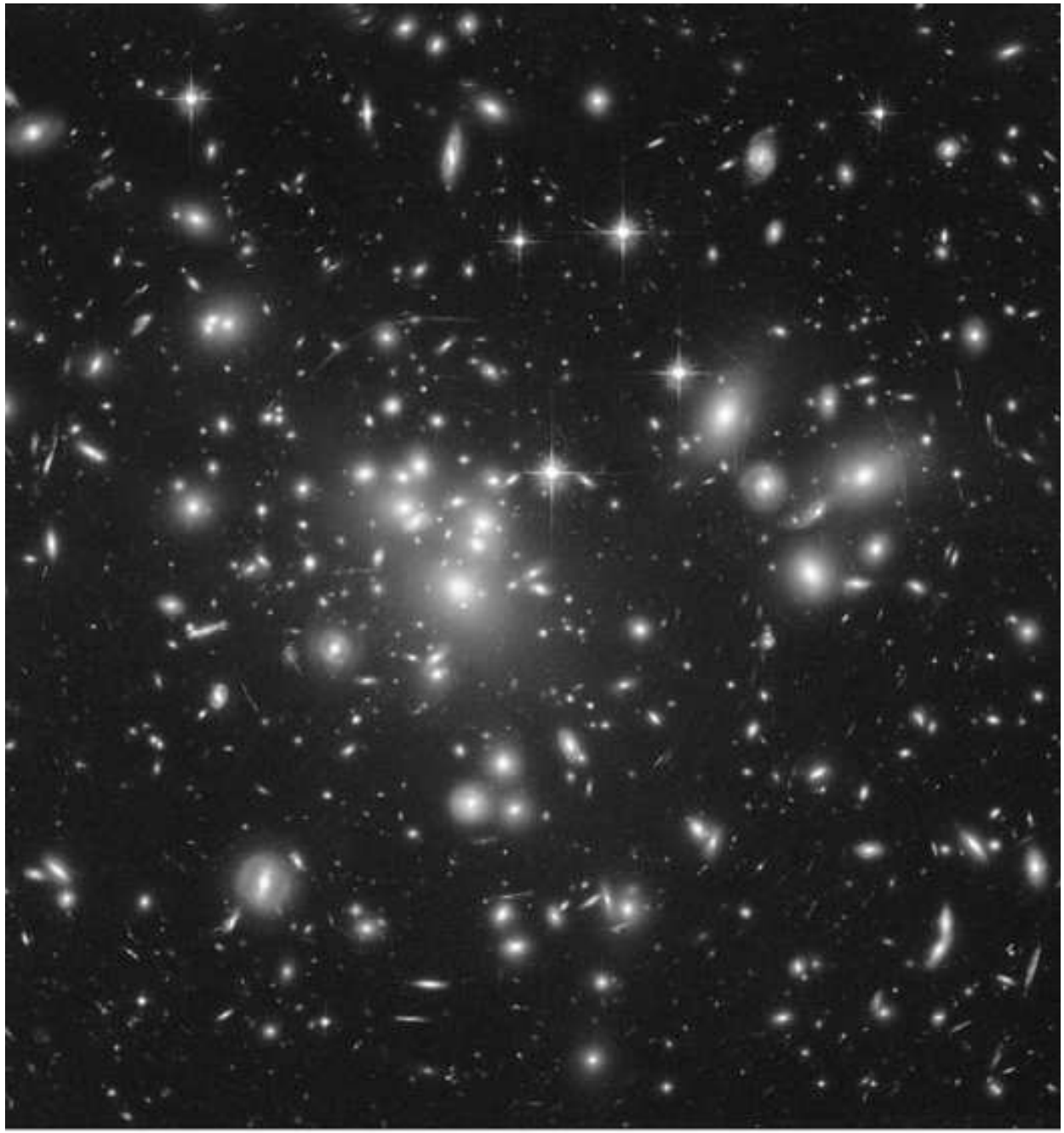


Figure 6.24 Virgo cluster: number of galaxies of various types between absolute magnitude M_B and $M_B + 1$. The luminosity function $\Phi(L)$ depends on galaxy type; the Schechter function of Equation 1.18 is only an average. Here, most bright galaxies with $M_B \lesssim -20$ are spirals; there are many faint ellipticals and even fainter dwarf galaxies. The heavy solid curve shows the total – H. Jerjen.

LF for different morphological types (E, S0, Sa-Sc, Irr, dIrr, dE) in the Virgo cluster. Notice dominance of early type galaxies in LF of clusters (aka morphology-density relation)

In central part of Abell 1689 Cluster : E/S0 dominate over spirals



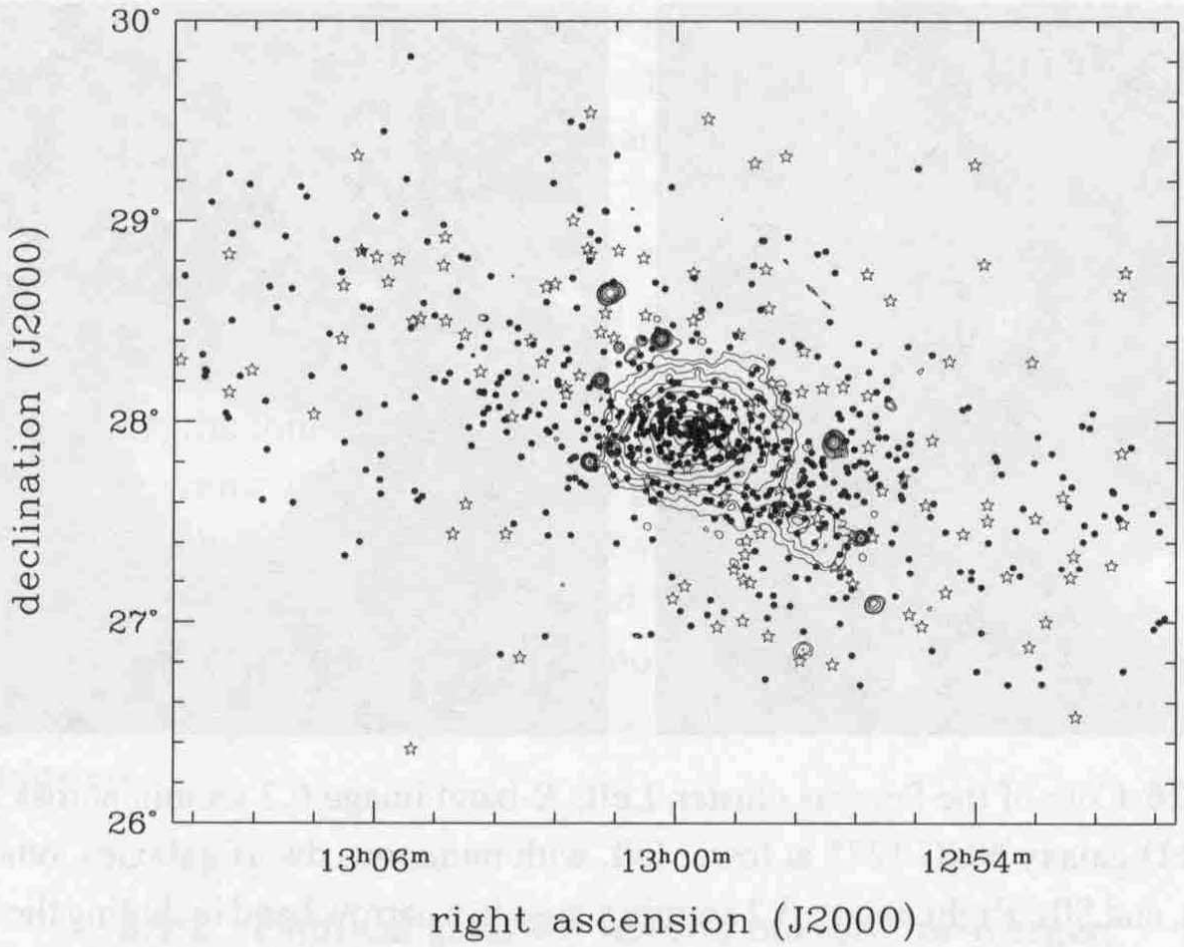


Figure 6.25 Coma cluster: solid dots show elliptical galaxies; open stars are spirals. Contours show the intensity of X-rays: the diffuse emission is from hot cluster gas; the point sources are distant active galaxies – M. van Haarlem.

Notice dominance of early type galaxies in center of rich clusters